

## PATENT ABSTRACTS OF JAPAN

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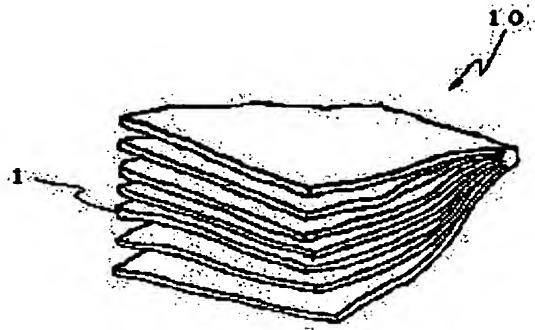
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## (54) BEDDING MATERIAL FOR ANIMAL

## (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide the subject material capable of hardly generating dust and suppressing raise of an ammonium concentration in a breeding cage compared with usual ones by bundling several pieces of a specific nonwoven fabric and integrating by partly fastening around their peripheries.

**SOLUTION:** Several small pieces 1 of a cellulose long fiber nonwoven fabric are bundled and integrated by partly fastening at their peripheries. In this case, each small piece 1 of the long cellulose fiber nonwoven fabric has 10–50 g/m<sup>2</sup> weight of the nonwoven fabric and  $\geq 0.5$  cm<sup>2</sup> to <25 cm<sup>2</sup> area of the small piece. It is preferable to bundle 4–20 sheets of the small piece 1. It is preferable that the small piece 1 of the cellulose long fiber nonwoven fabric has a rectangular peripheral shape, several sheets having the rectangular peripheral shape are bundled with mutual four edges in the same directions and one edge out of the four edges is fastened.



## LEGAL STATUS

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**CLAIMS**

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**[Claim(s)]**

**[Claim 1]** The floor cloth ingredient for animals which it comes to unify by bundling two or more wafers of a cellulose continuous glass fiber nonwoven fabric, wearing partially in the periphery side of them, and giving up.

**[Claim 2]** For the wafer of each cellulose continuous glass fiber nonwoven fabric, the amount of eyes of a nonwoven fabric is 10 – 50 g/m<sup>2</sup>. It is the range and the area of a wafer is 2 0.5cm. It is 2 25cm above. Floor cloth ingredient for animals according to claim 1 with which it is a wafer in the range of the following, and these 4–20 wafers are bundled.

**[Claim 3]** The wafer of each cellulose continuous glass fiber nonwoven fabric is a floor cloth ingredient for animals according to claim 1 or 2 which a periphery configuration is a rectangular wafer and is the thing which a rectangular wafer turns the mutual neighborhood in the same direction, and the periphery configuration which is two or more sheets is bundled, wears in one side in the neighborhood, and it comes to give up.

**[Claim 4]** The floor cloth ingredient for animals according to claim 1 to 3 whose cellulose is cotton (cotton).

**[Claim 5]** The floor cloth ingredient for animals according to claim 4 whose cellulose is the own hair (linter) of cotton (cotton).

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[Field of the Invention] In case this invention breeds the mouse for an experiment etc. in the gage for breeding, it relates to the floor cloth ingredient for animals laid by the floor of the gage for breeding.

[0002]

[Description of the Prior Art] As a floor cloth ingredient laid by the floor of the gage for breeding at the time of breeding the mouse for an experiment, a rat, etc. within the gage for breeding, what fabricated pulp in the shape of a split (the shape of a chip), and a wood chip have been used conventionally.

[0003]

[Problem(s) to be Solved by the Invention] A mouse and a rat may gnaw a floor cloth ingredient frequently during breeding. For this reason, the dust of a floor cloth ingredient is generated in the gage for breeding (when it is a wood chip, there are especially many yields of dust.), and the dust of this floor cloth ingredient has become the cause which causes mutual infection of an animal by relation with the ammonia gas concentration in a gage. That is, if there are many yields of dust and ammonia gas concentration is high, it will be easy to generate mutual infection of an animal. Moreover, we are anxious also about the infection to Homo sapiens, or generating of allergy.

[0004] This invention was made in view of the above-mentioned situation, dust cannot generate it easily, and it is making into the technical problem to offer the floor cloth ingredient for animals which can control the rise of the ammonia gas concentration in the gage for breeding conventionally moreover.

[0005]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, this invention persons considered application into the floor cloth ingredient for animals of the cellulose continuous glass fiber nonwoven fabric which the exposure product of a cellulose shows good large absorptivity. A cellulose continuous glass fiber nonwoven fabric has the exposure product of the cellulose per unit volume, and the large exposure product of the cellulose per unit weight as compared with the floor cloth ingredient (the thing and wood chip which fabricated pulp in the shape of a split) from the former. However, when the nonwoven fabric of size equivalent to the floor of the gage for breeding is laid to the floor, the stools and the urine which the nonwoven fabric shrank by movement of the bred animal, it became a big massive object, and the floor was exposed during breeding, consequently were excreted by the outcrop of this floor will contact, and ammonia gas will be generated. Then, cut out a cellulose continuous glass fiber nonwoven fabric to a wafer, and wear partially the wafer of the nonwoven fabric of two or more

sheets, and it is stopped in the periphery side of them. It is considered as the chip which consists of an aggregate of the wafer of the nonwoven fabric of two or more sheets, and stools and urine were separated, and moreover stools dried efficiently, without producing the big massive object of a nonwoven fabric, even if the animal exercised when this was necessary—thickness—seen to the floor and it was covered with it, and it found out that absorption maintenance of the urine might fully be carried out. That is, this invention has the following descriptions.

[0006] (1) The floor cloth ingredient for animals which it comes to unify by bundling two or more wafers of a cellulose continuous glass fiber nonwoven fabric, wearing partially in the periphery side of them, and giving up.

[0007] (2) For the wafer of each cellulose continuous glass fiber nonwoven fabric, the amount of eyes of a nonwoven fabric is 10 – 50 g/m<sup>2</sup>. It is the range and the area of a wafer is 2.05cm. It is 2.25cm above. Floor cloth ingredient for animals of the above-mentioned (1) publication with which it is a wafer in the range of the following, and these 4–20 wafers are bundled.

[0008] (3) The wafer of each cellulose continuous glass fiber nonwoven fabric is a floor cloth ingredient for animals the above (1) which a periphery configuration is a rectangular wafer and is the thing which a rectangular wafer turns the mutual neighborhood in the same direction, and the periphery configuration which is two or more sheets is bundled, wears in one side in the neighborhood, and it comes to give up, or given in (2).

[0009] (4) The floor cloth ingredient for animals given in either of above-mentioned (1) – (3) whose celluloses are cotton (cotton).

[0010] (5) The floor cloth ingredient for animals of the above-mentioned (4) publication whose cellulose is the own hair (linter) of cotton (cotton).

[0011]

[Function] The floor cloth ingredient for animals of this invention cuts out a cellulose continuous glass fiber nonwoven fabric to a wafer, is wearing partially, giving up and unifying in the periphery side of them, and is considering the wafer of the nonwoven fabric of two or more sheets as the chip which consists of an aggregate of the wafer of the nonwoven fabric of two or more sheets. Therefore, it has the gestalt from which the whole appearance may change easily a light weight and bulky, and moreover, though it is lightweight, the exposure product of a cellulose is large.

[0012] Therefore, if the floor cloth ingredient for animals of this invention is laid to the floor of the cage for breeding, the moderate clearance which the stools of an animal enter will be formed in the ingredient layer laid and obtained, and the stools of an animal are surrounded with cellulose continuous glass fiber, and the moisture will be absorbed efficiently and will dry them promptly. On the other hand, the absorptivity ability per unit weight of the ingredient layer laid and obtained will be boiled markedly, and will increase compared with it of the ingredient layer by the conventional floor cloth ingredient, and absorption maintenance of the urine

excreted from the animal is carried out promptly. Therefore, stools and urine are separated and generating of the ammonia gas considered to generate at the reaction of the enzyme in stools and urine mitigates. Therefore, as compared with the case where the conventional floor cloth ingredient is used, the rise of the ammonia gas concentration in a gage with time is suppressed low. Moreover, since itself cannot be easily broken by powder, even if an animal gnaws, dust is hardly generated, and a cellulose continuous glass fiber nonwoven fabric is flexible, and since it excels in impact absorptivity, it hardly produces dust also by friction with friction between ingredients, an animal, or a gage. Therefore, as compared with the case where the conventional floor cloth ingredient is used, the yield of the dust in a gage is reduced greatly.

[0013] Moreover, since it is the above-mentioned gestalt object, if an animal exercises, in connection with it, each ingredient will move easily, and the whole ingredient layer by which the ingredient which does not touch excrement (stools, urine) was not buried in the pars basilaris ossis occipitalis of the laid ingredient layer, and was laid will be effectively used for the water absorption of excrement (stools, urine).

[0014] Moreover, with the air by which endocyst was carried out to the opening which each ingredient has, and the opening by the lap of an ingredient, the laid ingredient layer shows good heat retaining property, and is urged to the delivery of a rearing animal, and childcare good.

[0015]

[Embodiment of the Invention] The floor cloth ingredient for animals of this invention consists of a wafer of a cellulose continuous glass fiber nonwoven fabric, two or more wafers of this cellulose continuous glass fiber nonwoven fabric are bundled, and it is worn partially, is stopped and is unified in the periphery side of them. It is in the \*\*\* condition that the condition "it wears partially and gives up" and that the wafer of each nonwoven fabric may move idly easily is acquired here, and is in the condition worn and stopped in 1/2 or less die-length part in the periphery side overall length of the wafer of a nonwoven fabric in general. Since the effective area which can contact stools and the urine of the wafer of a nonwoven fabric falls when it wore and gives up in a larger die-length part than one half of the overall lengths of the periphery side, the case where it wore and gives up in 1/2 or less die-length part of the overall length of the periphery side will become more desirable.

[0016] drawing 1 shows an example of the floor cloth ingredient for animals of this invention, and the rectangular wafer 1 bundles [ the periphery configuration which consists of a cellulose continuous glass fiber nonwoven fabric ] these two or more floor cloth ingredients 10 for animals -- having -- this -- each neighborhood was mutually turned in the same direction, and the wafer 1 of the rectangle of two or more sheets wore mutually of the neighborhoods at one side, and has given up. The wafer 1 of each rectangle is abbreviation same area, and may move idly centering on one side which each wore and stopped.

[0017] In the floor cloth ingredient for animals of this invention, especially the periphery configuration of the wafer of each cellulose continuous glass fiber nonwoven fabric is not limited. Although which configurations, such as circular, an ellipse form, and a polygon, are sufficient, in the ease of carrying out of processing which obtains the wafer of a nonwoven fabric It is desirable that it is the configuration of a rectangle as the clearance between the adjoining ingredients the ease of carrying out of \*\*\*\* of the wafer of two or more sheets and in the laid ingredient layer is formed and the wafer of each nonwoven fabric shows to the example of drawing 1 from points, such as easy. Moreover, as shown in the example of drawing 1 , as for each magnitude of the wafer of the cellulose continuous glass fiber nonwoven fabric of two or more sheets, it is desirable that it is abbreviation same area mutually from the point of the ease of carrying out of processing which obtains the wafer of a nonwoven fabric, the ease of carrying out of \*\*\*\* of two or more wafers, etc. However, even if the periphery configuration of each wafer of the cellulose continuous glass fiber nonwoven fabric of two or more sheets differs from area etc. mutually, if it has the effectiveness of this invention, it will not interfere at all.

[0018] In the floor cloth ingredient for animals of this invention, a number affects the engine performance of a floor cloth ingredient mutually in the area of each wafer in the wafer of the cellulose continuous glass fiber nonwoven fabric bundled two or more sheets, the amount of superintendent officers of a nonwoven fabric, and the bundle of a wafer.

[0019] That is, there is a possibility that the clearance between suitable magnitude to enter may become that stools will be hard to be formed into the ingredient layer from which it did not become high, but \*\* of an ingredient laid and was obtained if the area of each wafer is too small, and if too large, it will become easy to produce condensation of an ingredient by movement of an animal. Therefore, the area of each wafer is 2 0.5cm. It is 2 25cm above. It is desirable that it is in the range of the following, and it is 2 1cm 2-10cm. It is desirable that it is especially in the range. Moreover, the absorbing power of the urine per unit weight of the ingredient layer which will be laid and obtained if there are too few amounts of eyes of a nonwoven fabric tends to fall, and if many [ too ], it will become easy for the permeability in the ingredient layer laid and obtained to fall. Therefore, the amount of eyes of the nonwoven fabric of each wafer is 10 - 50 g/m<sup>2</sup>. The range is desirable and it is 20 - 40 g/m<sup>2</sup>. Especially the range is desirable. Moreover, the clearance between magnitude where stools were suitable for entering becomes if there are too few numbers in the bundle of a wafer, will be hard to be formed into the ingredient layer which the appearance of an ingredient becomes near flatly, and is laid and obtained, and if many [ too ], many wafers separated from the ingredient at the time of use will be generated, and it will become easy to be generated in adhesion to the wall and floor of a gage of a wafer which carried out water absorption. Therefore, about 4-20 sheets of a number are desirable in the bundle of a wafer, and especially about

5-7 sheets are desirable.

[0020] In addition, the thickness of the wafer of each cellulose continuous glass fiber nonwoven fabric has about 0.1-0.2 desirablenm.

[0021] In this invention, cotton (cotton), hemp, wood pulp, etc. are used as a cellulose used as the raw material of a cellulose continuous glass fiber nonwoven fabric. The point that absorptivity and especially permeability are excellent to cotton (cotton) is desirable. Any may be used although cotton (cotton) is divided into a fluff (lint) and own hair (linter). Own hair (linter) is cheap compared with a fluff (lint), and it is desirable to use own hair (linter) from the field of ingredient cost.

[0022] Although especially \*\*\*\*\* that wears partially the periphery side of the wafer of the cellulose continuous glass fiber nonwoven fabric of two or more sheets, and stops it in this invention is not limited, it is the process which cuts out the cellulose continuous glass fiber nonwoven fabric to the wafer of the configuration of \*\*\*\*\* in the required-number bundle, and is enlarging welding pressure of the decision cutting edge which judges the side which should be worn and stopped, for example, and the fiber of the wafer of the nonwoven fabric which laps up and down twines each other, wears it, and stops it in the side which should wear and stop. Since this approach can do a \*\*\*\* activity on coincidence at the decision process to the wafer of a nonwoven fabric, it is a desirable approach. Moreover, in this approach, \*\*\*\*\* can also be heightened by heating the decision cutting edge which judges the side which means \*\*\*\*. Moreover, the wafer of the nonwoven fabric of two or more sheets may be worn using adhesives in wearing by sticking by pressure according the side which means \*\*\*\* of a bundle in a bundle to a sticking-by-pressure machine separately, and giving up \*\*\*\*, and you may give up. The adhesives of the natural product system which does not affect the living body of an animal are used the \*\* case worn and stopped with adhesives.

[0023] Although what was manufactured by well-known various processes can be used for the cellulose continuous glass fiber nonwoven fabric used for this invention, it is desirable to use what was manufactured by the following processes. A raw material cellulose is dissolved in a solvent, an undiluted solution is made, and this undiluted solution is extruded fibrous from the nozzle by which two or more formation of the pore was carried out, and by putting, after netting this undiluted solution extruded fibrous, a fibrous undiluted solution is put together by itself, and it considers as a nonwoven fabric, and after washing this in cold water and making it dry, it rolls round by the machine and cuts into fixed die length. The configuration (\*\*\*\*) of the network used as a supporting material at the time of the adhesion process of a fibrous undiluted solution reflects in a product nonwoven fabric the cellulose continuous glass fiber nonwoven fabric obtained by this manufacture approach, a part with the large fiber consistency corresponding to the configuration (\*\*\*\*) of a network and a small part (the minimum part is a hole) are formed in a product nonwoven fabric, and it becomes mesh-like. Therefore, the ingredient layer which lays to the floor the construction ingredient of this invention produced using

this nonwoven fabric, and is obtained has better permeability.

[0024] The coefficient of water absorption per use floor cloth weight of 1g is 10-20ml, and the floor cloth ingredient for animals of this invention shows 2 to 3 times as much absorptivity as that of the conventional wood chip (average volume of a chip: 0.08cm<sup>3</sup>). "Use floor cloth weight" here is the value which measured the complement (g) by the standing method and the tap method to fill volume of 300ml of a floor cloth ingredient, and averaged the value (minimum value) by the standing method, and the value (maximum) by the tap method.

[0025]

[Example] Hereafter, the example of an experiment explains this invention in more detail.

[Example 1 of an experiment] The linter of cotton which performed washing, cooking, filtration, etc. and removed an impurity, dirt, dust, etc. is used as a raw material. the cellulose continuous glass fiber nonwoven fabric (Bemliese (the Asahi Chemical make --)) manufactured by the process of said instantiation A trade name, thickness:0.1-0.2mm, the amount of eyes : 20-40g/m<sup>2</sup> The ingredient (a cotton chip is called hereafter) which 5-7 wafers of a rectangular nonwoven fabric were bundled, and wore each other [ a rectangle / in one side ], stopped [ bundled seven sheets, judged to the rectangular wafer with the cutter, ], and was unified was produced. In addition, the size of a rectangular wafer produced three kinds of cotton chips which are 1cmx1cm, 2.5cmx2.5cm, and 5cmx5cm.

[0026] The trial laid 100g of cotton chips to the floor of L gage (the product made from Japanese CHARU sliver, floor space:1285cm<sup>2</sup>, and volume:25696cm<sup>3</sup>), and investigated the applicability as a floor cloth ingredient for animals. Breeding for seven days was performed to the rearing animal about each using the mouse (30 animals), the LEW rat (eight animals), and the MGS jird (ten animals).

[0027] Consequently, also in breeding of which animal, that whose sizes of a rectangle wafer are 1cmx1cm and 2.5cmx2.5cm dried stools, and that of urinary absorptivity was good, and there was also little capacity reduction of an ingredient. On the other hand, that whose size of a rectangle wafer is 5cmx5cm generated the lump which the cotton chip condensed in some places, and its capacity reduction of an ingredient was large. Therefore, it was judged that a cotton chip (the size of a rectangle wafer is 1cmx1cm and 2.5cmx2.5cm) comparatively smaller than a larger cotton chip (the size of a rectangle wafer is 5cmx5cm) was suitable.

[0028] [Example 2 of an experiment] The engine-performance comparative study of the cotton chip whose size of a rectangle wafer is 1cmx1cm, and wood SHIEBU (the average volume of a wood chip and a chip extracted from the boiled-fish-paste plate is 3 0.08cm) which is a common floor cloth ingredient for animals from the former was performed.

[0029] The trial conducted physicochemical quality inspection (water absorption test) with the field trial (the growth curve of an ammonia yield, a dust generating situation, and a rearing animal, and trial about heat retaining property).

[0030] While laying 150g of floor cloth ingredients which are a test objective to the floor of a <growth curve of ammonia yield, dust generating situation, and rearing animal> L gage, breeding the animal and measuring the ammonia gas concentration in the gage to 3-10 weeks old of after the birth with 1 time /and a Kitagawa style vacuum extraction gas detector a day, visual observation of the generating situation of the dust in a gage was carried out. Moreover, measurement of body weight of a rearing animal was performed. The mouse (30 animals) and the LEW rat (eight animals) were used for the rearing animal.

[0031] Consequently, with the breeding gage using a cotton chip, even if the breeding gage of a mouse and the breeding gage of a LEW rat passed over the 7th day of breeding, dust was not accepted. On the other hand, with the breeding gage using wood SHIEBU, dust was accepted for the breeding gage of a mouse, and the breeding gage of a LEW rat in \*\*\*\* and the water supply bottle of a lid of a cage from the 1st day of breeding.

[0032] The breeding gage using a cotton chip of the ammonia yield in a gage was clearly lower than the breeding gage with which the breeding gage of a mouse and the breeding gage of a rat used wood SHIEBU as shown in drawing 2 (A) and (B), and the ammonia concentration in the breeding gage using a cotton chip was a value low 15 to 60% compared with it in the breeding gage which used wood SHIEBU.

[0033] There was no great difference in a growth curve with the breeding gage with which wood SHIEBU was used for the growth curve of a rearing animal for the breeding gage of a mouse, and the breeding gage of a rat as shown in drawing 2 (A) and (B), and the breeding gage using a cotton chip.

[0034] To the floor of <heat-retaining-property> 707 gage (floor space: 1069cm<sup>2</sup> and volume:15497cm<sup>3</sup>), 70g (a cotton chip, wood SHIEBU) of floor cloth ingredients was laid, and the delivery of a mouse and a MGS jird and the childcare situation were observed to it. Consequently, there was no great difference in the delivery of a mouse and a MGS jird, and a childcare situation between the gage using wood SHIEBU, and the gage using a cotton chip.

[0035] The above trial showed that a cotton chip was compared with wood SHIEBU and the rise of the ammonia concentration with time in a gage and the yield of dust could be controlled.

[0036] About each of a <water absorption test> cotton chip (1cmx1cm) and wood SHIEBU, the complement (g) was measured by a following standing method and the following tap method to fill volume of 300ml, and the average of the value (minimum value) by the standing method and the value (maximum) by the tap method was defined as use floor cloth weight (g). The use floor cloth weight of 6.6g and wood SHIEBU of the use floor cloth weight of a cotton chip (1cmx1cm) was 9.9g. In addition, the value by the standing method and the value by the tap method used the average of measurement 5 times. Standing method: Use the measuring cylinder of 1L, and make it fall until it is set to 300ml, unfolding so that a floor cloth ingredient (a cotton chip, wood SHIEBU) may not condense from 5cm upper part

from opening of a measuring cylinder.

The tap method: A measuring cylinder is dropped 20 times on the bench from height of 5cm, add an impact (carrying out a tap), pack the clearance between floor cloth ingredients, and decrease the whole volume, after making it fall until a floor cloth ingredient (a cotton chip, wood SHIEBU) is set to 300ml from opening of a cylinder like a standing method. This activity is repeated until the volume after adding an impact is set to 300ml.

[0037] Next, to the floor cloth ingredient after the above-mentioned use floor cloth gravimetry (a cotton chip, wood SHIEBU), the filtration activity of the 600ml of the following water was done, use floor cloth weight was deducted from the weight of the floor cloth ingredient (a cotton chip, wood SHIEBU) which carried out water absorption after filtration, and the coefficient of water absorption by the floor cloth ingredient was measured. The filtration activity of 600ml of water: Put 600ml of water into the measuring cylinder in which the floor cloth ingredient after a use floor cloth gravimetry was held, and filter the floor cloth ingredient which carried out water absorption at the wire gauze of 1mm mesh after 24-hour standing. The weight of a floor cloth ingredient is measured after checking that put for about 3 minutes and waterdrop does not fall from a floor cloth ingredient.

[0038] About a cotton chip and each wood SHIEBU, the coefficient of water absorption was \*\*(ed) by use floor cloth weight, and the coefficient of water absorption per unit weight (coefficient of water absorption per use floor cloth weight of 1g) was calculated.

[0039] Consequently, the coefficient of water absorption of 11.8g and wood SHIEBU of the coefficient of water absorption of a cotton chip is 5.0g, and the cotton chip showed 2.4 times as many absorptivity as this as compared with wood SHIEBU. Therefore, a difference arises in the absorbed amount of the actual urine in a field trial according to the difference of this absorptivity, and ammonia concentration is imagined to be what was reduced greatly within the cage using a cotton chip.

[0040]

[Effect of the Invention] By the above explanation, according to the floor cloth ingredient for animals of this invention, the rise of the ammonia gas concentration with time in a breeding gage and the yield of dust can be low stopped so that clearly. Therefore, it is effective in prevention of mutual infection of a rearing animal, and generating of a raiser's allergy.

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[Translation done.]

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#### DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the perspective view showing an example of the floor cloth ingredient for animals of this invention.

[Drawing 2] (A) is drawing showing aging of the ammonia concentration in a breeding gage, and the weight of a mouse, and (B) is drawing showing aging of the ammonia concentration in a breeding gage, and the weight of a LEW rat.

[Description of Notations]

1 Wafer of Cellulose Continuous Glass Fiber Nonwoven Fabric

10 Floor Cloth Ingredient for Animals

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[Translation done.]

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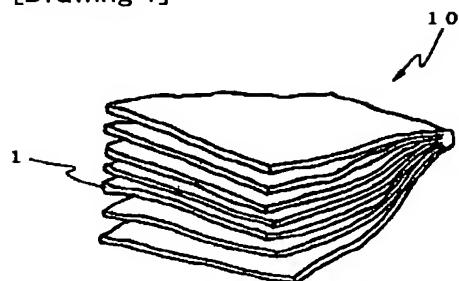
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#### DRAWINGS

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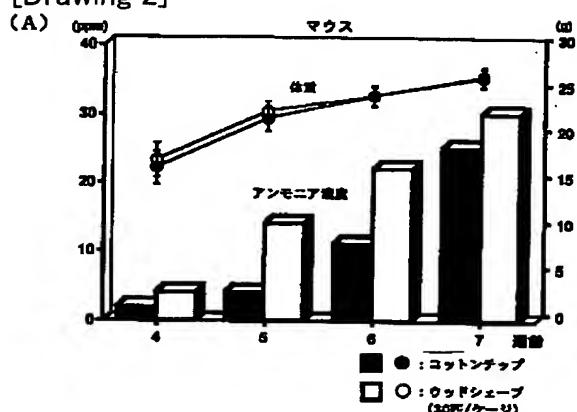
[Drawing 1]



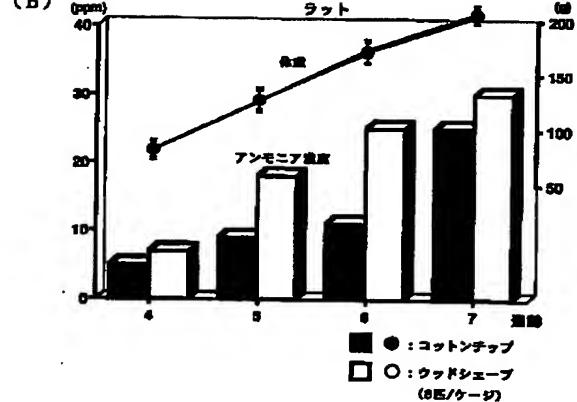
1 セルロース長繊維不織布の小片

1.0 動物用床敷材料

[Drawing 2]



(B) ラット



[Translation done.]

(19)日本国特許庁 (JP)

(12) 公開特許公報 (A)

(11)特許出願公開番号

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(P2000-333546A)

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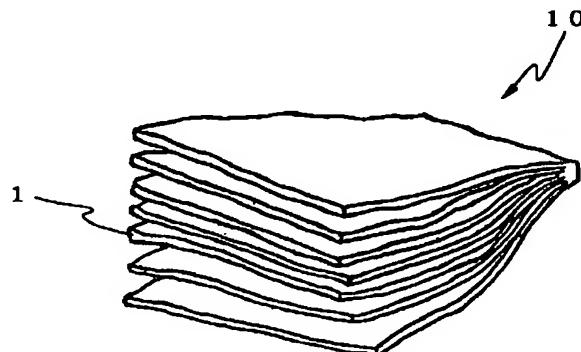
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(54)【発明の名称】 動物用床敷材料

(57)【要約】

【課題】 粉塵が発生しにくく、しかも、飼育用ゲージ内におけるアンモニアガス濃度の上昇を従来よりも抑制できる動物用床敷材料を提供する。

【解決手段】 セルロース長繊維不織布の小片1を複数枚束ねて、それらの外周辺にて部分的に着止して一体化して、複数枚のセルロース長繊維不織布の小片1の集合体からなる、床敷材料10とする。



1 セルロース長繊維不織布の小片

10 動物用床敷材料

## 【特許請求の範囲】

【請求項1】 セルロース長纖維不織布の小片が複数枚束ねられ、それらの外周辺にて部分的に着止されて一体化されてなる動物用床敷材料。

【請求項2】 各セルロース長纖維不織布の小片は、不織布の目付量が $10 \sim 50 \text{ g/m}^2$  の範囲で、小片の面積が $0.5 \text{ cm}^2$  以上、 $25 \text{ cm}^2$  未満の範囲にある小片であり、該小片が4~20枚束ねられている請求項1記載の動物用床敷材料。

【請求項3】 各セルロース長纖維不織布の小片は、外周形状が矩形の小片であり、複数枚の、外周形状が矩形の小片が、互いの四辺を同一方向に向けて束ねられ、四辺のうちの一辺にて着止されてなるものである請求項1又は2記載の動物用床敷材料。

【請求項4】 セルロースが綿（コットン）である請求項1~3のいずれかに記載の動物用床敷材料。

【請求項5】 セルロースが綿（コットン）の地毛（リンター）である請求項4記載の動物用床敷材料。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、実験用マウス等を飼育用ゲージ内において飼育する際に飼育用ゲージの床に敷設される動物用床敷材料に関する。

## 【0002】

【従来の技術】実験用マウス、ラット等を飼育用ゲージ内で飼育する際の飼育用ゲージの床に敷設される床敷材料としては、従来、バルブを細片状（チップ状）に成形したものや、木材チップが使用されてきた。

## 【0003】

【発明が解決しようとする課題】マウスやラットは、飼育中、頻繁に床敷材料をかじることがある。このため、飼育用ゲージ内に床敷材料の粉塵が発生し（特に、木材チップの場合に粉塵の発生量が多い。）、該床敷材料の粉塵が、ゲージ内のアンモニアガス濃度との関係で、動物の相互感染を引き起こす原因となっている。つまり、粉塵の発生量が多く、アンモニアガス濃度が高いと動物の相互感染が発生しやすい。また、ヒトへの感染やアレルギーの発生も懸念されている。

【0004】本発明は上記事情に鑑みてなされたもので、粉塵が発生しにくく、しかも、飼育用ゲージ内におけるアンモニアガス濃度の上昇を従来よりも抑制できる動物用床敷材料を提供することを課題としている。

## 【0005】

【課題を解決するための手段】上記課題を解決するため、本発明者は、セルロースの露出面積が大きく良好な吸水性を示すセルロース長纖維不織布の動物用床敷材料への適用を検討した。セルロース長纖維不織布は、従来からの床敷材料（バルブを細片状に成形したものや木材チップ）と比較して、単位体積当たりのセルロースの露出面積及び単位重量当たりのセルロースの露出面積が

大きい。しかし、飼育用ゲージの床と同等のサイズの不織布を床に敷設した場合、飼育している動物の運動によって不織布が縮まって大きな塊状物となり、飼育中に床が露出し、その結果、該床の露出部に排泄された糞と尿とが接触して、アンモニアガスを発生してしまう。そこで、セルロース長纖維不織布を小片に裁断し、複数枚の不織布の小片の集合体からなるチップとし、これを床に所要厚み數き詰めると、動物が運動しても不織布の大きな塊状物を生じることなく、糞と尿とが分離され、しかも、糞が効率良く乾燥し、かつ、尿が充分に吸収保持されることを見出しました。すなわち、本発明は以下の特徴を有しています。

【0006】(1) セルロース長纖維不織布の小片が複数枚束ねられ、それらの外周辺にて部分的に着止されて一体化されてなる動物用床敷材料。

【0007】(2) 各セルロース長纖維不織布の小片は、不織布の目付量が $10 \sim 50 \text{ g/m}^2$  の範囲で、小片の面積が $0.5 \text{ cm}^2$  以上、 $25 \text{ cm}^2$  未満の範囲にある小片であり、該小片が4~20枚束ねられている上記(1)記載の動物用床敷材料。

【0008】(3) 各セルロース長纖維不織布の小片は、外周形状が矩形の小片であり、複数枚の、外周形状が矩形の小片が、互いの四辺を同一方向に向けて束ねられ、四辺のうちの一辺にて着止されてなるものである上記(1)又は(2)記載の動物用床敷材料。

【0009】(4) セルロースが綿（コットン）である上記(1)~(3)のいずれかに記載の動物用床敷材料。

【0010】(5) セルロースが綿（コットン）の地毛（リンター）である上記(4)記載の動物用床敷材料。

## 【0011】

【作用】本発明の動物用床敷材料は、セルロース長纖維不織布を小片に裁断し、複数枚の不織布の小片を、それらの外周辺にて部分的に着止して一体化することで、複数枚の不織布の小片の集合体からなるチップとしている。よって、軽量且つ嵩高で、全体の外形が容易に変化し得る形態を有し、しかも、軽量でありながらセルロースの露出面積が大きい。

【0012】よって、本発明の動物用床敷材料を飼育用ゲージの床に敷設すると、敷設して得られる材料層内には動物の糞が入り込む適度な隙間が形成され、動物の糞はセルロース長纖維で取り囲まれて、その水分が効率良く吸収され、速やかに乾燥する。一方、敷設して得られる材料層の単位重量当たりの吸水性能は従来の床敷材料による材料層のそれに比べて格段に増大することとなり、動物から排泄された尿は速やかに吸収保持される。従って、糞と尿とが分離され、糞中の酵素と尿との反応で発生すると考えられている、アンモニアガスの発生が軽減する。よって、従来の床敷材料を用いた場合に比し

て、ゲージ内のアンモニアガス濃度の経時的な上昇が低く抑えられる。また、セルロース長繊維不織布はそれ自体が粉状に碎かれ難いものであるので、動物がかじっても粉塵を殆ど発生せず、しかも、柔軟で衝撃吸収性に優れることから、材料間の摩擦や、動物やゲージとの摩擦によっても粉塵を殆ど生じない。よって、従来の床敷材料を用いた場合に比して、ゲージ内の粉塵の発生量が大きく低減される。

【0013】また、上記形態物であることから、動物が運動すると、それに伴って個々の材料が容易に移動し、排泄物（糞、尿）と接触していない材料が、敷設された材料層の底部に埋もれてしまうことがなく、敷設された材料層全体が有効に排泄物（糞、尿）の水分吸収に利用される。

【0014】また、敷設された材料層は、個々の材料が有する空隙及び材料の重なりによる空隙に内包された空気によって、良好な保温性を示し、飼育動物の出産、哺育が良好に促される。

#### 【0015】

【発明の実施の形態】本発明の動物用床敷材料は、セルロース長繊維不織布の小片からなり、該セルロース長繊維不織布の小片が複数枚束ねられて、それらの外周辺で部分的に着止されて一体化されたものである。ここで「部分的に着止される」とは、各不織布の小片が、容易に遊動し得る状態が得られる着止状態であり、概ね、不織布の小片の外周辺全長における $1/2$ 以下の長さ部分で着止された状態である。外周辺の全長の $1/2$ より大きい長さ部分で着止された場合、不織布の小片の、糞や尿と接触し得る、有効面積が低下するため、外周辺の全長の $1/2$ 以下の長さ部分で着止された場合がより好ましいものとなる。

【0016】図1は本発明の動物用床敷材料の一例を示し、該動物用床敷材料10は、セルロース長繊維不織布からなる外周形状が矩形の小片1が複数枚束ねられ、該複数枚の矩形の小片1が、それぞれの四辺が互いに同一方向に向けられて、四辺のうちの一辺にて互いに着止されている。各矩形の小片1は、略同一面積で、それぞれが着止された一辺を軸に遊動し得る。

【0017】本発明の動物用床敷材料において、各セルロース長繊維不織布の小片の外周形状は特に限定されず、円形、楕円形、多角形等のいずれの形状でもよいが、不織布の小片を得る加工のし易さ、複数枚の小片の着止のし易さ、及び、敷設した材料層内における隣接する材料間での隙間の形成され易さ等の点から、各不織布の小片が、図1の例に示すような、矩形の形状であることが好ましい。また、複数枚のセルロース長繊維不織布の小片のそれの大きさは、図1の例に示すように、互いに略同一面積であることが、不織布の小片を得る加工のし易さ及び複数の小片の着止のし易さ等の点から好ましい。但し、複数枚のセルロース長繊維不織布の各小

片の外周形状、面積等が互いに異なったものであっても、本発明の効果を有するものであれば、何ら差し支えない。

【0018】本発明の動物用床敷材料において、複数枚束ねられたセルロース長繊維不織布の小片における、各小片の面積、不織布の目付け量、及び小片の束ね数は、床敷材料の性能に相互に影響を及ぼす。

【0019】すなわち、各小片の面積が小さ過ぎると、材料の嵩が高くならず、敷設して得られた材料層中に、糞が入り込むに適當な大きさの隙間が形成されにくくなるおそれがあり、大き過ぎると、動物の運動によって材料の凝集が生じやすくなる。よって、各小片の面積は $0.5\text{ cm}^2$ 以上、 $2.5\text{ cm}^2$ 未満の範囲にあるのが好ましく、 $1\text{ cm}^2 \sim 10\text{ cm}^2$ の範囲にあるのが特に好ましい。また、不織布の目付量が少な過ぎると、敷設して得られる材料層の単位重量当たりの尿の吸収能が低下しやすく、多過ぎると、敷設して得られる材料層内の通気性が低下しやすくなる。よって、各小片の不織布の目付量は $1.0 \sim 5.0\text{ g/m}^2$ の範囲が好ましく、 $2.0 \sim 4.0\text{ g/m}^2$ の範囲が特に好ましい。また、小片の束ね数が少な過ぎると、材料の外形が偏平に近くなり、敷設して得られる材料層中に糞が入り込むに適した大きさの隙間が形成されにくくなり、多過ぎると、使用時に材料から分離した小片を多く発生し、水分吸収した小片のゲージの壁や床への付着が生じやすくなる。よって、小片の束ね数は $4 \sim 20$ 枚程度が好ましく、 $5 \sim 7$ 枚程度が特に好ましい。

【0020】なお、各セルロース長繊維不織布の小片の厚みは $0.1 \sim 0.2\text{ mm}$ 程度が好ましい。

【0021】本発明において、セルロース長繊維不織布の原料となるセルロースとしては、綿（コットン）、麻、木材パルプ等が用いられる。吸水性、通気性が特に優れている点から、綿（コットン）が好ましい。綿（コットン）は綿毛（リント）と地毛（リンター）に分けられるが、いずれを用いてもよい。地毛（リンター）は綿毛（リント）に比べて安価であり、材料コストの面からは、地毛（リンター）を用いるのが好ましい。

【0022】本発明において、複数枚のセルロース長繊維不織布の小片の外周辺を部分的に着止する方法は特に限定されないが、例えば、セルロース長繊維不織布を所要数束ねて所望の形状の小片に裁断していく工程で、着止すべき辺を裁断する裁断刃の加圧力を大きくすることで、上下に重なる不織布の小片の繊維が着止すべき辺で絡まり合って着止される。該方法は、不織布の小片への裁断工程で着止作業を同時に実行るので好ましい方法である。また、該方法において、着止を意図する辺を裁断する裁断刃を加熱することで、着止力を高めることもできる。また、複数枚の不織布の小片を束ね、束の着止を意図する辺を別途圧着機による圧着で着止したり、接着剤を用いて着止してもよい。接着剤で着止する場合、動

5 物の生体に影響を与えない、天然物系の接着剤が使用される。

【0023】本発明に使用されるセルロース長纖維不織布は、公知の種々の製法で製造されたものを使用できるが、以下の製法で製造されたものを使用するのが好ましい。原料セルロースを溶剤に溶解して原液を作り、該原液を細孔が複数形成されたノズルから纖維状に押し出し、この纖維状に押し出された原液をネットの上で積み重ねることで、纖維状原液を自力でくっつけて不織布とし、これを水洗いして乾燥させた後、機械で巻き取り、一定長さにカットする。かかる製造方法で得られたセルロース長纖維不織布は、纖維状原液の付着工程時の支持材として用いるネットの形状（地柄）が製品不織布に反映し、製品不織布にはネットの形状（地柄）に対応した纖維密度の大きい部分と小さい部分（最小部分は孔）が形成されてメッシュ状となる。よって、この不織布を用いて作製された本発明の敷設材料を床に敷設して得られる材料層はより良好な通気性を有するものとなる。

【0024】本発明の動物用床敷材料は、使用床敷重量1g当たりの吸水量が10～20mlで、従来の木材チップ（チップの平均体積：0.08cm<sup>3</sup>）のそれの2～3倍の吸水性を示す。ここでの「使用床敷重量」とは、床敷材料の300mlの容積を満たすに必要な量（g）を静置法とタップ法で測定し、静置法による値（最小値）とタップ法による値（最大値）とを平均した値である。

## 【0025】

【実施例】以下、実験例により本発明を更に詳しく説明する。

【実験例1】洗浄、蒸煮、濾過等を行って、不純物、汚れ、埃等を取り除いた、綿のリンターを原料として、前記例示の製法で製造したセルロース長纖維不織布（ベンリーゼ（旭化成製、商品名）、厚み：0.1～0.2mm、目付量：20～40g/m<sup>2</sup>）を、7枚束ねて、裁断機により矩形の小片に裁断し、矩形の不織布の小片が5～7枚束ねられて、矩形の一辺にて互いに着止されて一体化した材料（以下、コットンチップと称する）を作製した。なお、矩形の小片のサイズが1cm×1cm、2.5cm×2.5cm、5cm×5cmの3種類のコットンチップを作製した。

【0026】試験は、Lゲージ（日本チャールスリバー製、床面積：1285cm<sup>2</sup>、容積：25696cm<sup>3</sup>）の床にコットンチップを100g敷設し、動物用床敷材料としての適用性を調べた。飼育動物にはマウス（30匹）、LEWラット（8匹）、MGSスナネズミ（10匹）を用い、それぞれについて、7日間の飼育を行った。

【0027】その結果、矩形小片のサイズが1cm×1cm、2.5cm×2.5cmのものは、いずれの動物の飼育においても、糞は乾燥し、尿の吸収性も良好で、

材料の容量減少も少なかった。これに対し、矩形小片のサイズが5cm×5cmのものは、コットンチップが凝集した塊を所々発生し、また、材料の容量減少が大きかった。よって、大きめのコットンチップ（矩形小片のサイズが5cm×5cm）よりも、比較的小さめのコットンチップ（矩形小片のサイズが1cm×1cm、2.5cm×2.5cm）が好適であると判断した。

【0028】【実験例2】矩形小片のサイズが1cm×1cmのコットンチップと、従来からの一般的な動物用床敷材料であるウッドシェーブ（蒲鉾板から採取した木材チップ、チップの平均体積が0.08cm<sup>3</sup>）との性能比較試験を行った。

【0029】試験は、フィールド試験（アンモニア発生量、粉塵発生状況、飼育動物の成長曲線及び保温性についての試験）と、物理化学的性質検査（吸水性試験）を行った。

【0030】＜アンモニア発生量、粉塵発生状況、飼育動物の成長曲線＞Lゲージの床に試験対象である床敷材料を150g敷設して動物を飼育し、生後3～10週齢までのゲージ内のアンモニアガス濃度を、1回／日、北川式真空採取ガス検知管によって測定するとともに、ゲージ内の粉塵の発生状況を目視観察した。また、飼育動物の体重測定を行った。飼育動物にはマウス（30匹）、LEWラット（8匹）を用いた。

【0031】その結果、コットンチップを用いた飼育ゲージでは、マウスの飼育ゲージ及びLEWラットの飼育ゲージ共に、飼育7日目を過ぎても粉塵は認められなかった。これに対し、ウッドシェーブを用いた飼育ゲージでは、マウスの飼育ゲージ及びLEWラットの飼育ゲージ共に、飼育1日目からケージの蓋のふち及び給水瓶に粉塵が認められた。

【0032】ゲージ内のアンモニア発生量は、図2(A) (B)に示すように、マウスの飼育ゲージ及びラットの飼育ゲージ共に、ウッドシェーブを用いた飼育ゲージよりもコットンチップを用いた飼育ゲージの方が明らかに低く、コットンチップを用いた飼育ゲージ内のアンモニア濃度はウッドシェーブを用いた飼育ゲージ内のそれに比べて15～60%低い値であった。

【0033】飼育動物の成長曲線は、図2(A) (B)に示すように、マウスの飼育ゲージ及びラットの飼育ゲージ共に、ウッドシェーブを用いた飼育ゲージとコットンチップを用いた飼育ゲージで成長曲線に大差はなかった。

【0034】＜保温性＞707ゲージ（床面積：1069cm<sup>2</sup>、容積：15497cm<sup>3</sup>）の床に、床敷材料（コットンチップ、ウッドシェーブ）を70g敷設し、マウス、MGSスナネズミの出産、哺育状況を観察した。この結果、ウッドシェーブを用いたゲージとコットンチップを用いたゲージ間で、マウス、MGSスナネズミの出産、哺育状況に大差はなかった。

【0035】以上の試験の結果、コットンチップはウッドシェーブにくらべて、ゲージ内における経時的なアンモニア濃度の上昇及び粉塵の発生量を抑制できることが分かった。

【0036】<吸水性試験>コットンチップ(1cm×1cm)とウッドシェーブのそれぞれについて、300m1の容積を満たすに必要な量(g)を下記の静置法とタップ法で測定し、静置法による値(最小値)とタップ法による値(最大値)の平均値を使用床敷重量(g)と定義した。コットンチップ(1cm×1cm)の使用床敷重量は6.6g、ウッドシェーブの使用床敷重量は9.9gであった。なお、静置法による値及びタップ法による値は5回測定の平均値を用いた。静置法：1Lのメスシリンダーを使用し、メスシリンダーの口から5cm上方より床敷材料(コットンチップ、ウッドシェーブ)が凝集しないようにほぐしながら300m1となるまで落下させる。

タップ法：静置法と同様にしてシリンダーの口から床敷材料(コットンチップ、ウッドシェーブ)を300m1となるまで落下させた後、5cmの高さからメスシリンダーを作業台上に20回落下させて、衝撃を加え(タップし)、床敷材料間の隙間を詰めて全体の体積を減少させる。この作業を、衝撃を加えた後の体積が300m1となるまで繰り返す。

【0037】次に、上記使用床敷重量測定後の床敷材料(コットンチップ、ウッドシェーブ)に対して、下記の水600m1の濾過作業を行って、濾過後の水分吸収した床敷材料(コットンチップ、ウッドシェーブ)の重量から使用床敷重量を差し引いて、床敷材料による吸水量を測定した。水600m1の濾過作業：使用床敷重量測定後の床敷材料が収容されたメスシリンダーに水600m1

\*を入れ、24時間静置後、1mmメッシュの金網で水分吸収した床敷材料を濾過。約3分間静置して床敷材料から水滴が落ちないことを確認後、床敷材料の重量を測定する。

【0038】コットンチップとウッドシェーブそれぞれについて、吸水量を使用床敷重量で除して、単位重量当たりの吸水量(使用床敷重量1g当たりの吸水量)を求めた。

【0039】この結果、コットンチップの吸水量は11.8g、ウッドシェーブの吸水量は5.0gであり、コットンチップはウッドシェーブに比して2.4倍の吸水性を示した。よって、この吸水性の差によってフィールド試験での実際の尿の吸収量に差が生じ、コットンチップを用いたケージ内ではアンモニア濃度が大きく低減したものと推察される。

#### 【0040】

【発明の効果】以上の説明により明らかなように、本発明の動物用床敷材料によれば、飼育ゲージ内の経時的なアンモニアガス濃度の上昇及び粉塵の発生量を低く抑えることができる。よって、飼育動物の相互感染や飼育者のアレルギーの発生の防止に有効である。

#### 【図面の簡単な説明】

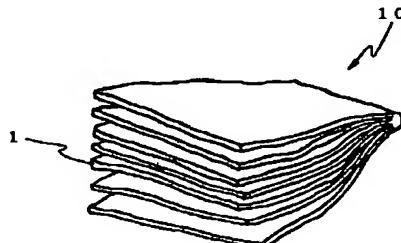
【図1】本発明の動物用床敷材料の一例を示す斜視図である。

【図2】(A)は飼育ゲージ内のアンモニア濃度及びマウスの体重の経時変化を示す図であり、(B)は飼育ゲージ内のアンモニア濃度及びLEWラットの体重の経時変化を示す図である。

#### 【符号の説明】

- 30 1 セルロース長繊維不織布の小片  
10 動物用床敷材料

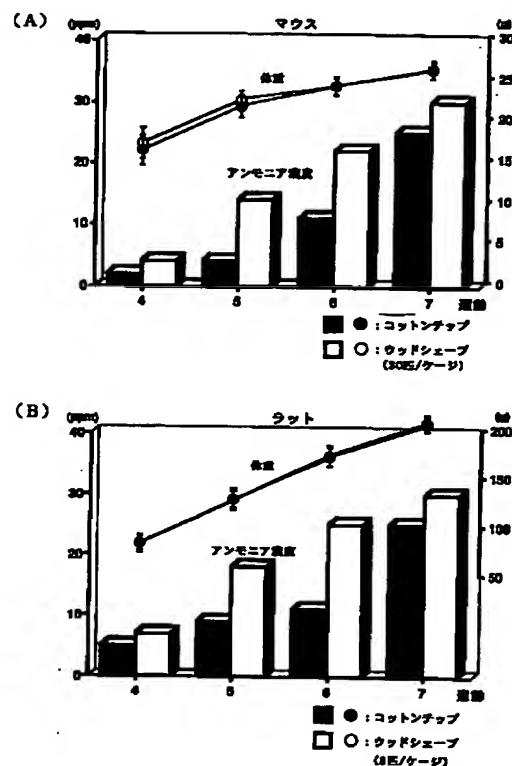
【図1】



1 セルロース長繊維不織布の小片

10 動物用床敷材料

【図2】



フロントページの続き

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